

# DATA Sheet

## Total Suspended Solids Systems



Model 711  
Portable MLSS/ILA System



Model 7011A  
Continuous Monitor

### Applications Model 711

- ◆ Remote monitoring
- ◆ Environmental / Conservation
- ◆ Aeration basin monitoring
- ◆ Education / Classroom studies
- ◆ Clarifier control
- ◆ Aquaculture

### Features Model 711

- ◆ Two complete analyzers in one package (TSS & Interface Level)
- ◆ Microprocessor based
- ◆ Automatic ranging
- ◆ Simple, insitu calibration
- ◆ Electronic self-diagnostics
- ◆ Nine volt battery with automatic shutoff
- ◆ Waterproof, rugged housing

### Features Model 7011A

- ◆ Microprocessor based
- ◆ Automatic ranging
- ◆ Phased array source for automatic color compensation control (**Model 73B**)
- ◆ Simple to use insitu calibration
- ◆ Menu driven text help screens
- ◆ Automatic ambient light compensation (**Model 72A**)
- ◆ Electronic self-diagnostics
- ◆ Digital communications with isolation and surge protection
- ◆ Isolated current or voltage outputs
- ◆ Microprocessor-based
- ◆ Two setpoint relays
- ◆ User selectable calibration curves
- ◆ NEMA 4X (IP65) enclosure

# A Common Monitoring and Control Analyzer for All Applications

The Royce **Model 7011A** Suspended Solids Analyzer provides reliable, continuous operation in waste treatment plants, rivers, lakes and other aqueous systems. A user friendly text screen provides menu driven setup and operation in easy to understand language. The instrument will read in either milligrams per liter or percent solids and is auto-ranging. With features that include insitu calibration, automatic color compensation, True microprocessor operation and automatic ambient light compensation, the **Model 7011A** has set the standard for measuring suspended solids.

The **Model 7011A** has standard outputs that include 4 to 20 milliamp or 0 to 1 volt, RS-485 serial communication port, and two programmable setpoint relays. Both the 4 to 20 and the RS-485 outputs are isolated. The 4 to 20ma and 0 to 1 V are scaled by the end user. The RS-485 output also provides for surge protection against power variations or electrical storms. The setpoint relays can be independently configured as either a high or low setpoint and can be utilized for direct control or for alarming. Self-cleaning frequency of sensor optical surfaces are user programmable from the instrument keypad in order to adapt to the customer's requirements.

As with all Royce instrumentation, the Model 7011A exhibits the same high standard of quality workmanship and materials that has made Royce the leader in the water quality monitoring industry. A NEMA 4X (IP65) enclosure, self-cleaning sensors, self-diagnostics and help screens illustrate the commitment that Royce has made to ensure that our customers receive the correct monitoring instrument for their needs. A one year warranty on parts and labor and a toll free technical support line are, of course, standard.

## Range:

0 - 10,000 up to 0 - 80,000 mg/l  
(Sensor Dependent)

## Standard Outputs:

4 - 20 mA or 0 - 1 VDC (Isolated)  
RS-485 serial port (isolated and surge protected)

## Standard Setpoints:

Two programmable setpoint relays  
All relays are form C rated 250 VAC, 7 Amps resistive

## Readout Device:

Harsh environment, 2.2 x 1.5 inch LCD digital display

## Input Power:

Switch selectable 115/230 VAC, 60/50 Hz

## Enclosure:

NEMA 4X (IP65) Fiberglass

## Instrument Ambient Conditions:

Temperature: -10 to 50° C  
With Heater: -40 to 50° C  
Humidity: 0 to 100%

## Analyzer Options:

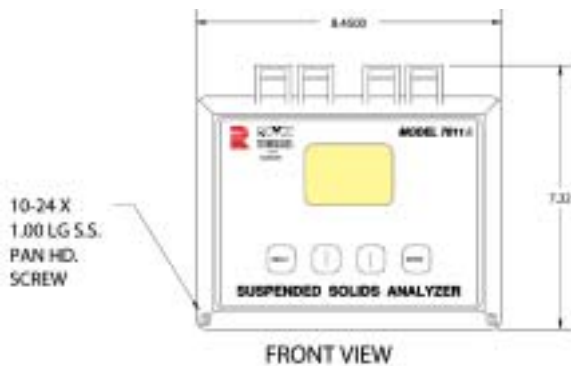
NEMA 4X enclosure with quick disconnect for sensor  
Rear Rail mounting kit  
JB-93 junction box with quick disconnect for sensor

## Weight:

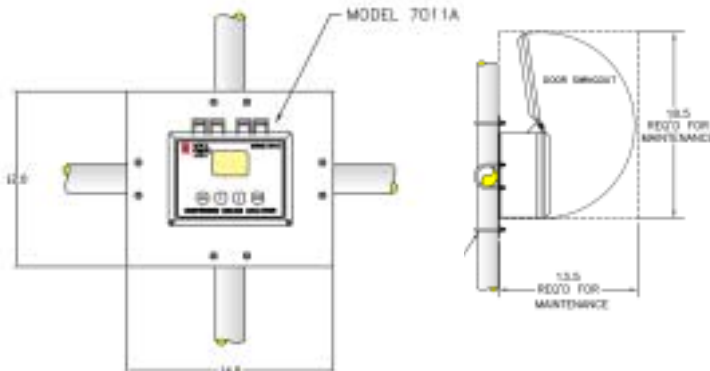
5.5 Lbs (2.5 kgms)



## Analyzer Dimensions



## Rail Kit Outline and Mounting



## JB-93 Junction Box



## Construction:

Polystyrene NEMA 4X  
(IP65)

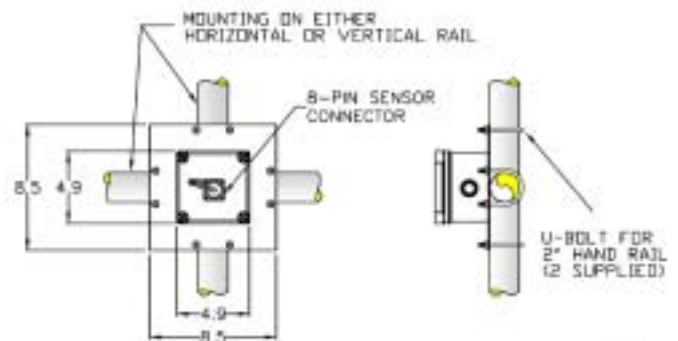
## Options:

Rail Mounting Kit

## Weight:

JB-93: 2 Lbs  
With rail mount kit: .5 Lbs

## Rail Kit Outline and Mounting



## Model 72A Low Range TSS Sensor

The **Model 72A** is for low ranges commonly experienced in effluent streams (0 - 1500 mg/l). It incorporates a unique automatic ambient light compensating technology that allows for clean water monitoring insitu, without requiring sample intake lines for reflection chambers. Automatic self cleaning is available.

### Type:

Single Gap Optical

### Range:

**0 - 10 up to 0 - 1500 mg/l**  
**0 - 5 up to 0 - 500 NTU**

### Resolution:

1 mg/l

### Accuracy:

± 5% of reading or  
± 5 mg/l, whichever is greater

### Repeatability:

± 1% of reading or  
± 2 mg/l, whichever is greater

### Operating Limits:

Temperature: 0 - 50° C  
Pressure: 0 - 50 PSIG

### Size:

4.5 inches square

### Weight:

5.5 Lbs (2.5 kgms)

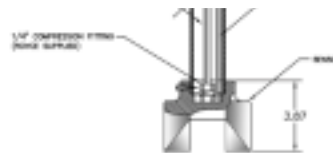
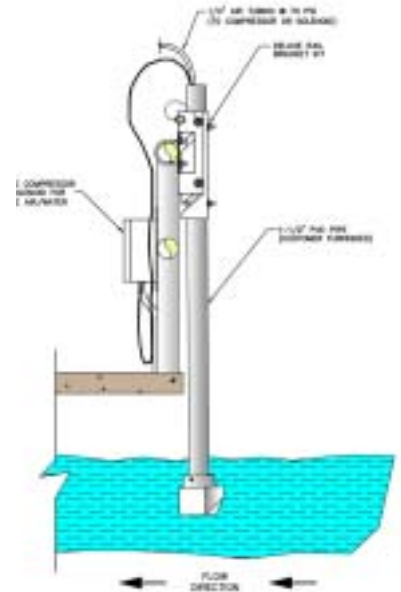
### Construction:

Chemically resistant polyurethane optics  
in polyurethane housing



## Model 72A Sensor Mounting

- ◆ The sensor cable is a 5 conductor shielded 22 AWG. It is available in 25 and 50 foot lengths as standard, or can be special ordered as required.
- ◆ A connector for quick disconnect to the 7011A monitor is available as an optional convenience on the sensor and analyzer. The connector option on the sensor is required when used with the JB-93 junction box.
- ◆ All Royce suspended solids sensors are equipped for an air or water jet cleaning.



## Model 72P Flow Through Low Range TSS Sensor

The **Model 72P** is a low range, flow through version of the popular Model 72A. Commonly used in outfall plumbing of packaged WWTP's, portable potable water systems, backwash filter lines and other process water lines for the measurement of low level suspended solids.



Model 72P; Optical; 3" Flanged Spool Mounted; Air or Water Jet Self-Cleaning

Range: **0 - 10 up to 0 - 1500 mg/l,**  
**0 - 500 NTU**

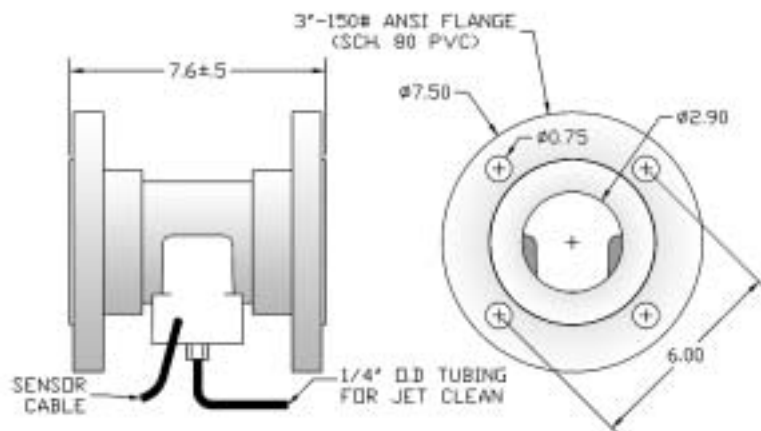
Construction: Molded Epoxy/PVC

Limits: Temp. 0 - 50° C

Pressure: 0 - 20 PSIG

## Model 72P Sensor Mounting

- ◆ The sensor cable is a 5 conductor shielded 22 AWG. It is available in 25 and 50 foot lengths as standard, or can be special ordered as required.
- ◆ A connector for quick disconnect to the 7011A monitor is available as an optional convenience on the sensor and analyzer. The connector option on the sensor is required when used with the JB-93 junction box.
- ◆ All Royce suspended solids sensors are equipped for an air or water jet cleaning.



## Model 73B and 75A Submersible MLSS Sensor

The **Model 73B** submersible sensor is designed for mixed liquor suspended solids or MLSS typically found in aeration basins. This sensor uses phased array color compensation to correlate light absorption with suspended solids. The **Model 75A** is designed for open channels that have a higher concentration of solids, such as return activated sludge that flows in open channels rather than in pipes.

### Type:

Single Gap, Optical; self cleaning. **Model 73B** has phased array emitter/receptor combination for automatic color compensation.

### 73B Range:

0 - 3,000 up to 0 - 30,000 mg/l  
0 - 3%

### 75A Range: (Single Color):

0 - 5,000 up to 0 - 50,000 mg/l  
0 - 5%

### Accuracy:

**73B:** ± 5% of reading or ± 100 mg/l, whichever is greater

**75A:** ± 5% of reading or ± 150 mg/l, whichever is greater

### Repeatability:

**73B:** ± 1% of reading or ± 20 mg/l, whichever is greater

**75A:** ± 1% of reading or ± 30 mg/l, whichever is greater

### Operating Limits:

Temperature: 0 - 50° C

Pressure: 0 - 50 PSIG

### Size:

2.5 inches diameter

3.3 inches long

### Weight:

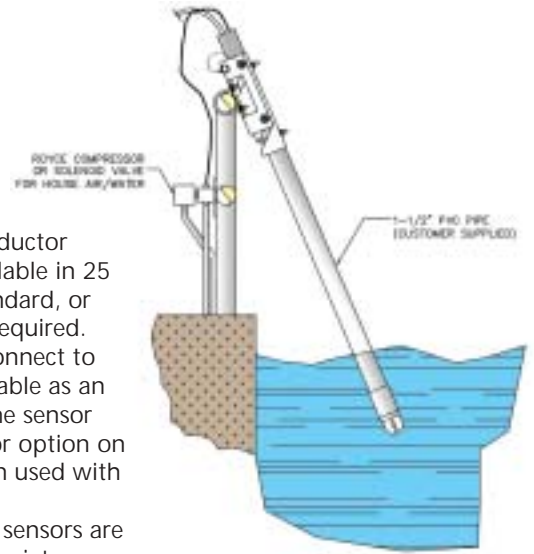
12 ounces (.34 kgms)

### Construction:

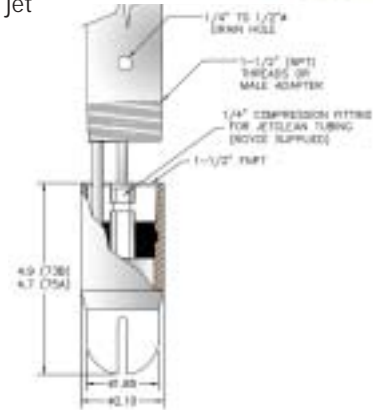
Chemically resistant polyurethane optics

Molded polymer housing

## Sensor Mounting



- ◆ The sensor cable is a 8 conductor shielded 22 AWG. It is available in 25 and 50 foot lengths as standard, or can be special ordered as required.
- ◆ A connector for quick disconnect to the **7011A** monitor is available as an optional convenience on the sensor and analyzer. The connector option on the sensor is required when used with the **JB-93** junction box.
- ◆ All Royce suspended solids sensors are equipped for an air or water jet cleaning.



## Models 73P and 75P Flow Through MLSS Sensors



The **Models 73P and 75P** inline MLSS sensors are common for use with inline mixed liquor applications, septic waste influent applications, and packaged WWTP RAS, WAS MLSS and influent lines.

### 73P

Mid-Range; Color Compensated; Pipe insertion; Air or Water Jet Self Cleaning  
Range: **0 - 3,000 up to 0 - 30,000 mg/l**

0 - 3%

Construction: Molded Epoxy/PVC

Limits: Temp. 0 - 50° C

Pressure: 0 - 20 PSIG

### 75P

Mid-Range; Optical; Pipe insertion; Air or Water Jet Self Cleaning

Range: 0 - 5,000 up to 0 - 50,000 mg/l

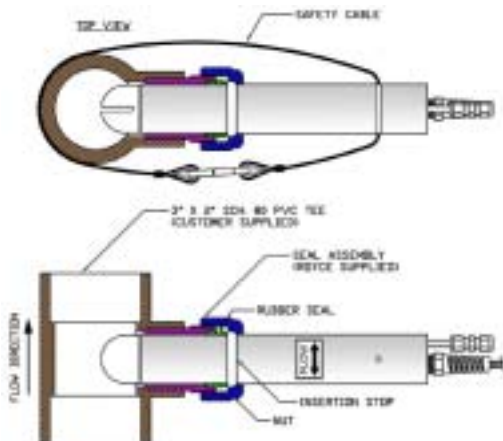
0 - 5%

Construction: Molded Epoxy/PVC

Limits: Temp. 0 - 50° C

Pressure: 0 - 20 PSIG

## Models 73P and 75P Sensor Mounting



- ◆ The sensor cable is a 8 conductor shielded 22 AWG. It is available in 25 and 50 foot lengths as standard, or can be special ordered as required.
- ◆ A connector for quick disconnect to the **7011A** monitor is available as an optional convenience on the sensor and analyzer. The connector option on the sensor is required when used with the **JB-93** junction box.
- ◆ All Royce suspended solids sensors are equipped for an air or water jet cleaning.
- ◆ Supplied complete with 3" PVC TEE as shown

## Model 74A and 76A High Density Pipe Insertion Sensors

The Model 74A and 76A in-line sensors are used in WAS (Waste Activated Sludge) and RAS (Return Activated Sludge) line applications. These sensors offer automatic water Jet cleaning of the sensor optics by house supplied water.

### Type:

Single Gap, Optical; self cleaning water jet

### 74A Range:

0 - 8,000 up to 0 - 80,000 mg/l  
0 - 8%

### 76A Range:

0 - 3,000 up to 0 - 30,000 mg/l  
0 - 3%

### Accuracy:

74A:  $\pm 5\%$  of reading or  $\pm 150$  mg/l, whichever is greater

76A:  $\pm 5\%$  of reading or  $\pm 100$  mg/l, whichever is greater

### Repeatability:

74A:  $\pm 1\%$  of reading or  $\pm 30$  mg/l, whichever is greater

76A:  $\pm 1\%$  of reading or  $\pm 30$  mg/l, whichever is greater

### Operating Limits:

Temperature: 0 - 50° C

Pressure: 0 - 50 PSIG

### Size:

2 inch insertion diameter

19 inches long

2 inch NPT male pipe insertion nipple

### Weight:

16 pounds (7 kgms)

### Construction:

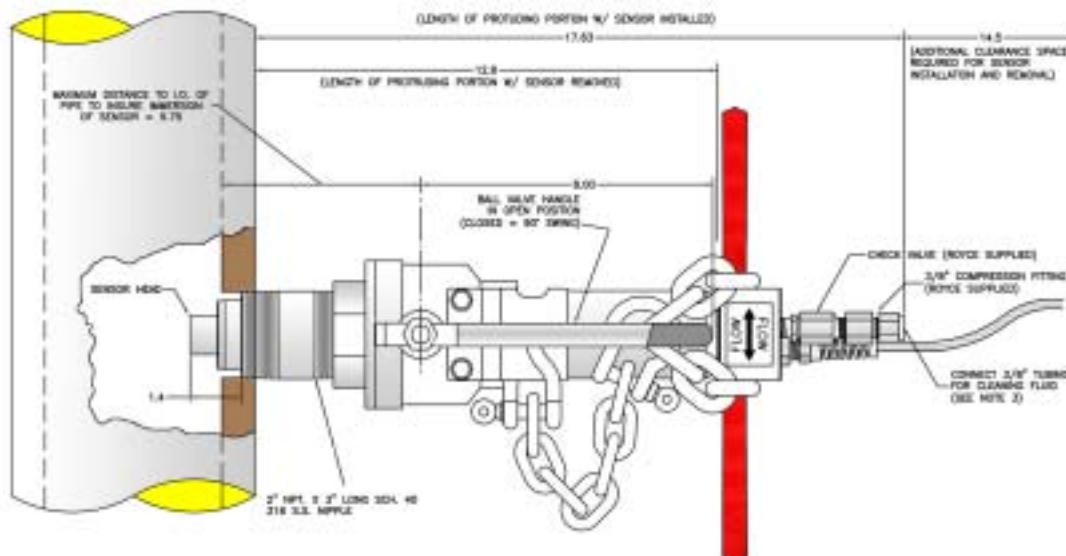
316 SS insertion shaft and lens holders

Chemically resistant polyurethane optics



- ◆ The sensor cable is a 8 conductor shielded 22 AWG. It is available in 25 and 50 foot lengths as standard, or can be special ordered as required.
- ◆ A connector for quick disconnect to the 7011A monitor is available as an optional convenience on the sensor and analyzer. The connector option on the sensor is required when used with the JB-93 junction box.
- ◆ Cleaning connection supplied by Royce to house water is 3/8" compression fitting. Cleaning pressure must be 20 PSIG greater than line pressure
- ◆ All Royce suspended solids sensors are equipped for an air or water jet cleaning

## Models 74A & 76A Outline and Mounting



# Royce Compressor Assembly For Submersible MLSS Sensor Jet Clean For Optics

The sensor optics are jet cleaned by an air or water blast across the optics on a timed basis which is controlled by the parent instrument. Cleaning frequency and duration of the jet blast are programmed by the user to meet the demand of the application where optical surfaces are soiled by organic or biological fouling.

All Royce suspended solids sensors are equipped for jet cleaning of the sensor optics by house supplied air or water using a solenoid. A minimum of 30 PSIG and a maximum of 60 PSIG is required for house air or water.

The Royce Compressor Assembly is compatible with submersible MLSS sensors and is available as an option. The **Model 74A** and **76A** inline sensors can not use the Royce Compressor Assembly.



## Compressor Specifications

**Type:**

Air Compressor, light continuous duty

**Pressure Supplied:**

40 to 60 PSIG

**Temperature Limits:**

0 to 50° C

**Enclosure:**

NEMA 4X, 14" W x 12" H x 6" D

**Weight:**

23 pounds (10.4 kgms)

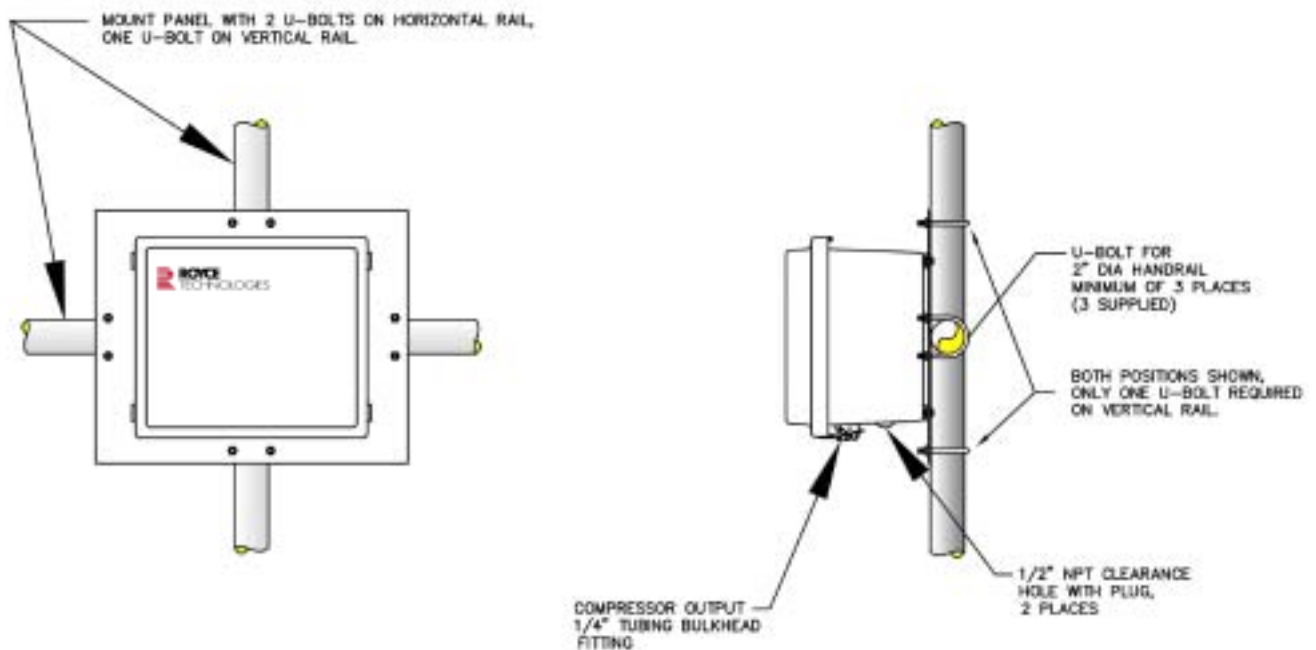
26 pounds (11.8 kgms) with Rail Mounting Kit

**Options:**

Heater (Recommended for -10° C)

Rail Mounting Kit

## Compressor Outline and Mounting



# Model 711 Portable Suspended Solids and Interface Level Analyzer

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The Royce **Model 711** Portable Suspended Solids/ Interface Level Analyzer is a rugged, waterproof instrument designed for the rigors of remote sampling. The meter provides reliable operation in waste treatment plants, rivers, lakes and other aqueous systems. The meter will read in either grams per liter when in the suspended solids mode or relative density percentage while in the interface level mode of operation.

The **Model 711** stores the calibration values for suspended solids and interface level in two separate non-volatile memory locations allowing the user to switch between operational modes without having to recalibrate. The net effect is two analyzers in one.

## Model 711 Specific Features

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- ◆ **Two analyzers in one package:**  
Switch from Solids measurement to Interface level without losing calibration.
- ◆ **Automatic ranging:**  
Goes completely over the operating range of the analyzer with manual adjustment.
- ◆ **Simple, insitu calibration:**

Due to the full utilization of the microprocessor, calibration values are stored so that recalibration is not required on a daily basis. If the sensor is cleaned after use, monthly calibration is usually more than sufficient for proper operation in either mode of calibration.

The **Model 711** analyzer utilizes the **Model 71** medium range sensor. The **Model 71** is a rugged, reliable sensing element that has polymer optical grade lenses. It was designed specifically to meet the rigorous demands that are a requirement for a portable sensor.

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## Model 711 / 71 Specifications

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### Range:

0 - 10 grams per liter (0 to 10,000 mg/l)

### Readout Device:

Harsh environment, 1/2" LCD digital display

### Input Power:

Standard 9V battery

### Enclosure:

Waterproof

### Size:

7 inches long  
3.2 inches wide  
1.5 inches deep

### Weight:

1.5 pounds (.68 kgms)

### Type:

Single Gap, Optical

**Accuracy:**  $\pm 5\%$  of reading or  $\pm 100$  mg/l, whichever is greater

### Repeatability:

$\pm 1\%$  of reading or  $\pm 20$  mg/l, whichever is greater

### Range:

0 - 10 g/l

### Operating Limits:

Temperature, 0 - 65° C  
Pressure, 0 - 50 PSIG

### Size:

4 inches long  
2 inches diameter

### Weight:

1 pound (.45 kgms)

### Construction:

Polyurethane body  
Optical grade polymer lenses

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## Supplied Standard with Model 711 System

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- ◆ **Model 711** rugged Suspended Solids analyzer
- ◆ **Model 71** rugged SS sensor with 8 meters or 25 feet of cable and waterproof, military connector. Cable is scaled in one foot increments.
- ◆ Velcro "grip strap" which can convert to a handy belt holder.
- ◆ 9V battery.
- ◆ Detailed instruction manual.



13555 Gentilly Road  
New Orleans, LA 70129  
800/347-3505  
504/254-8888

FAX: 504/254-8855 - [royce@sanitaire.itt.com](mailto:royce@sanitaire.itt.com)  
Web Site: <http://www.roycetechnologies.com>

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